

ABSTRACT

Apparatus and methods are described for effective removal of emboli or harmful fluids during vascular procedures, such as angiography, balloon angioplasty, stent deployment,

5 laser angioplasty, atherectomy, intravascular ultrasonography and other therapeutic and diagnostic procedures. A catheter with an occluder mounted at its distal end creates an occlusion proximal to the lesion. The catheter provides a pathway for introducing a treatment catheter. Prior to, during or subsequent to the procedure, suction is activated to establish retrograde flow to remove emboli from the site. Additionally, a thin catheter
10 with a distal fluid ejection nozzle may be introduced distal to the treatment site to rinse emboli from the treatment site. The suction flow and/or ejected fluid flow may be varied in a pulsatile manner to simulate regular blood flow and/or perturb settled emboli into being captured that may otherwise not be collected. The method establishes a protective environment before any devices enter the site to be treated.

15